Evaluation of Multiplex-PCR for Simultaneous Identification of Salmonella enteritidis, Shigella flexneri, and Escherichia coli O157: H7 in Poultry

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Aims: Foodborne infections caused by bacteria, including Salmonella enteritidis, Shigella flexneri, and Escherichia coli O157:H7 are one of the most common diseases among poultry and humans. The purpose of this study was the simultaneous and rapid detection of important microorganisms found in fecal samples of poultry and poultry workers.

Materials & Methods: A total of 144 fecal samples were taken from poultry and poultry farms workers. Fecal swabs were cultured on specific media, and biochemical tests were performed for further confirmation of bacterial isolates. Moreover, genomic DNA of fecal swabs was extracted for molecular identification of S. enteritidis, E. coli O157: H7, and S. flexneri species using multiplex-PCR technique.

Findings: According to the multiplex-PCR technique results, 16.7, 13.9, and 9.5% of the poultry samples were positive for the presence of S. enteritidis, E. coli O157: H7, and S. flexneri species, respectively; whereas culture method results showed the corresponding prevalence rates of 18.1, 15.2, and 12.5% for the above species. Moreover, regarding the samples collected from the poultry farms workers, multiplex PCR showed the prevalence rates of 6.9, 12.5, and 4.2% for S. enteritidis, E. coli O157: H7 , and S. flexneri species, respectively; whereas culture method showed the corresponding prevalence rates of 8.3, 13.9, and 13.9% for the above species.

Conclusion: In the current study, the sensitivity and specificity of multiplex-PCR in detecting S. enteritidis, E. coli O157: H7, and S. flexneri species were 74 and 100% for samples taken from the poultry farms workers, and 82.2 and 100% for samples taken from the poultry, respectively, suggesting the possibility of using a designed multiplex-PCR method for rapid detection of infectious agents in poultry farms.

Keywords: Salmonella enteritidis, Shigella flexneri, Escherichia coli, Muliplex-PCR, Poultry.